Integrating the Healthcare Enterprise

IHE

IHE Quality, Research and Public Health Technical Framework Supplement

Mobile Retrieve Form for Data Capture (mRFD)

Rev. 1.0 – Draft for Public Comment

Date: May 26, 2017
Author: QRPH Technical Committee
Email: QRPH@ihe.net

Foreword

This is a supplement to the IHE Quality, Research and Public Health (QRPH) Technical Framework V1.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on May 26, 2017 for public comment. Comments are invited and may be submitted at http://www.ihe.net/QRPH_Public_Comments. In order to be considered in development of the trial implementation version of the supplement, comments must be received by June 25, 2017.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

Amend Section X.X by the following:

Where the amendment adds text, make the added text **<u>bold underline</u>**. Where the amendment removes text, make the removed text **~~bold strikethrough~~**. When entire new sections are added, introduce with editor's instructions to "add new text" or similar, which for readability are not bolded or underlined.

General information about IHE can be found at www.ihe.net.

Information about the IHE QRPH domain can be found at http://www.ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at http://www.ihe.net/IHE_Process and http://www.ihe.net/Profiles.

The current version of the IHE QRPH Technical Framework can be found at http://www.ihe.net/Technical_Frameworks.

CONTENTS

Introduction to this Supplement

190 The Mobile Retrieve Form for Data Capture (mRFD) Profile provides a method for gathering data within a user's current application to meet the requirements of an external system. mRFD supports RESTful retrieval of forms from a form source, display and completion of a form, and return of instance data from the display application to the source application. The workflows defined in this supplement are based on those defined by the Retrieve Form for Data Capture (RFD) Profile.

195 ## Open Issues and Questions

1. There is no reliable mapping available at this time between CDA and FHIR resources. As such, it may be a backward compatibility break for a system to migrate from RFD to mRFD, or to make use of mRFD transactions in conjunction with RFD transactions. Looking for comment on whether this direction is sufficient.

200   a. There has been interest in making CDA and FHIR backwards compatible (http://hl7.org/fhir/us/ccda/2016Sep/).

    b. mRFD's approach is to allow retrieval of a CDA using the requisite FHIR resource. In doing so, any existing derivation rules for CDA can be implemented alongside the FHIR launch.

205 2. SMART on FHIR allows two different launch methodologies. The "EHR Launch" method is similar to the original RFD Profile's approach to filling out forms. That is the approach that has been adapted into mRFD. The "Standalone Launch" approach is not included, but may be considered for inclusion at a later time. Looking for comment on priority of this addition.

210 3. SMART on FHIR has, at the time of this document's writing, not been updated to FHIR STU3. mRFD is aimed to be FHIR STU agnostic. This means that whether the content of Mobile Populate Form and Mobile Retrieve Capability use a specific STU of FHIR is up to the implementation. Looking for comment on this approach.

4. When a Data Responder is working closely with a Form Filler, the OAuth2 215 "Authorization Flow" is what is used, as described here in mRFD. For Data Responders that have a pre-arranged agreement with a Form Manager, they would instead use the "client credentials" or "SMART backend Services" method of integration. That method has not been profiled into mRFD at this time and may be considered for inclusion at a later time. Looking for comment on priority of this addition.

220 ## Closed Issues

None.

General Introduction

Appendix A – Actor Summary Definitions

225

Actor	Definition
Data Responder	A Data Responder is a system that may have information that can be used by a Form Manager in preparation of form data. It is available to respond to RESTful queries from trusted Form Manager systems.
Form Filler	A Form Filler is a system that needs to complete forms that are managed by an external entity.
Form Manager	A Form Manager is a system that maintains form definitions and can provide them to systems that need to fill them out.

Appendix B – Transaction Summary Definitions

Transaction	Definition
Mobile Authorize Form [QRPH-50]	This transaction is used to authorize the relationship between the actors.
Mobile Populate Form [QRPH-52]	This transaction is used to retrieve data to fill out fields in a form.
Mobile Retrieve Access Token [QRPH-51]	This transaction is used to retrieve initial access to fill out fields in a form.
Mobile Retrieve Capability [QRPH-49]	This transaction is used to retrieve a statement of behaviors from the Data Responder.
Mobile Retrieve Form [QRPH-48]	This transaction is used to request a form that needs to be completed.

Glossary

Glossary Term	Definition
Autopopulate	This term is used in the Structured Data Capture (SDC) Profile to define content that is pulled into a form by a Form Filler. This contrasts against Prepopulate (RFD) and Querypopulate (mRFD)
Clinical Document Architecture (CDA®[1])	This term is used to describe conformance of an XML document against a variety of industry standards.
Electronic Health Record (EHR)	This term is used to describe a system that maintains a longitudinal view of a patient's history. It contains comprehensive information on a patient's health.
Electronic Medical Record (EMR)	This term is used to describe a system that maintains a narrow view of a patient's history. It is primarily used by providers to diagnose and treat conditions.
Prepopulate	This term is used in the Retrieve Form for Data Capture (RFD) Profile to define content that is submitted by a Form Filler and used to populate a form before an end user needs to fill in data. This contrasts against Autopopulate (SDC) and Querypopulate (mRFD)

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[1] CDA is the registered trademark of Health Level Seven International.

Glossary Term	Definition
Querypopulate	This term is used in this profile to define content that is populated into a form via use of RESTful queries to systems that may contain that discrete information. This contrasts against Autopopulate (SDC) and Prepopulate (RFD).
Research Management System (RMS)	This term is used to describe a system that manages research information related to clinical trials or studies.

230

Volume 1 – Profiles

X Mobile Retrieve Form for Data Capture (mRFD) Profile

The Mobile Retrieve Form for Data Capture (mRFD) Profile provides a method for gathering
data within a user's current application to meet the requirements of an external system. mRFD
235 supports the retrieval of forms from a form source, display and completion of a form, and return
of instance data from the display application to the source application.

X.1 mRFD Actors, Transactions, and Content Modules

This section defines the actors, transactions, and/or content modules in this profile. General
definitions of actors are given in the Technical Frameworks General Introduction Appendix A at
240 http://ihe.net/TF_Intro_Appendices.aspx.

The mRFD Profile supports lightweight versions of the transactions in the basic RFD Profile,
including Mobile Retrieve Form, Mobile Submit Form and Mobile Archive Form. It also
introduces a transactions for use in authenticating the actors and populating forms.

Figure X.1-1 shows the actors directly involved in the mRFD Profile and the relevant
245 transactions between them. If needed for context, other actors that may be indirectly involved
due to their participation in other related profiles are shown in dotted lines. Actors which have a
mandatory grouping are shown in conjoined boxes.
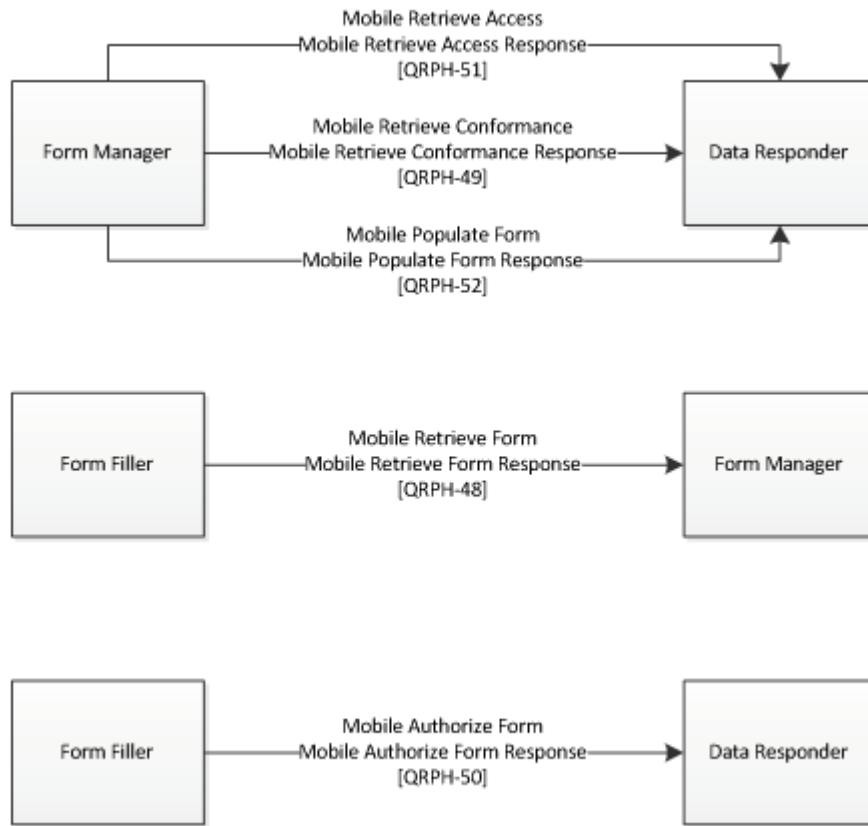
250 **Figure X.1-1: mRFD Actor Diagram**

Table X.1-1 lists the transactions for each actor directly involved in the mRFD Profile. To claim
compliance with this profile, an actor shall support all required transactions (labeled "R") and
may support the optional transactions (labeled "O").

Table X.1-1: mRFD Profile - Actors and Transactions

Actors	Transactions	Optionality	Reference
Data Responder	Mobile Authorize Form (Response) [QRPH-50]	R (Note 1)	QRPH TF-2: 3.Y1
	Mobile Populate Form (Response) [QRPH-52]	R	QRPH TF-2: 3.Y1
	Mobile Retrieve Access Token (Response) [QRPH-51]	R (Note 1)	QRPH TF-2: 3.Y1
	Mobile Retrieve Capability (Response)[QRPH-49]	R (Note 1)	QRPH TF-2: 3.Y1
Form Filler	Mobile Authorize Form (Request) [QRPH-50]	R	QRPH TF-2: 3.Y1

Actors	Transactions	Optionality	Reference
	Mobile Retrieve Form (Request)[QRPH-48]	R	QRPH TF-2: 3.Y1
Form Manager	Mobile Populate Form (Request) [QRPH-52]	R	QRPH TF-2: 3.Y1
	Mobile Retrieve Access Token (Request) [QRPH-51]	R	QRPH TF-2: 3.Y1
	Mobile Retrieve Form (Response) [QRPH-48]	R	QRPH TF-2: 3.Y1
	Mobile Retrieve Capability (Request)[QRPH-49]	R	QRPH TF-2: 3.Y1

255   Note 1 - A Form Filler will have a preferred Data Responder. The preferred Data Responder is Required to support these messages. Other Data Responders will not support those messages.

Table X.1-2 lists the content module(s) defined in the mRFD Profile. To claim support with this profile, an actor shall support all required content modules (labeled "R") and may support
260   optional content modules (labeled "O").

Table X.1-2: mRFD Profile - Actors and Content Modules

Actors	Content Modules	Option ality	Reference
Form Filler	-	O	QRPH TF-3
Form Manager	-	O	QRPH TF-3
Data Responder	-	O	QRPH TF-3

X.1.1 Actor Descriptions and Actor Profile Requirements

Normative requirements are typically documented in Volume 2 (Transactions) and Volume 3
265   (Content Modules). Some Integration Profiles, however, contain requirements which link transactions, data, and/or behavior. Those Profile requirements are documented in this section as normative requirements ("SHALL")

X.1.1.1 Form Filler

The role of the Form Filler in this profile is the one defined in the RFD Profile in ITI TF-1:17.

270   ## X.1.1.2 Form Manager

The role of the Form Manager in this profile is the one defined in the RFD Profile in ITI TF-1:17.

X.1.1.3 Data Responder

The Data Responder in this section is the one defined in the MHD Profile.

X.2 mRFD Actor Options

Options that may be selected for each actor in this profile, if any, are listed in the Table X.2-1.
Dependencies between options when applicable are specified in notes.

A given Form Filler will have a preferred Data Responder to use with populating form data. The
preferred Data Responder must support a full authentication workflow including Mobile Retrieve
Capability Request and Mobile Retrieve Access Token Request. The preferred Data Responder
must also support Mobile Authorize for.

Standalone Data Responder systems may use other authentication methods to verify their
identity. And they do not need to support Mobile Authorize Form.

Table X.2-1: mRFD - Actors and Options

Actor	Option Name	Reference
Form Filler	-	-
Form Manager	-	-
Data Responder	Mobile Retrieve Capability [QRPH-49] (Note 1)	QRPH TF-2: 3.Y1
	Mobile Authorize Form [QRPH-50] (Note 1)	QRPH TF-2: 3.Y1
	Mobile Retrieve Access Token [QRPH-51] (Note 1)	QRPH TF-2: 3.Y1

Note 1 - A Form Filler will have a preferred Data Responder. That Data Responder is required to support all options.

X.3 mRFD Required Actor Groupings

An actor from this profile (Column 1) shall implement all of the required transactions and/or
content modules in this profile *in addition to* all of the transactions required for the grouped
actor (Column 2).

If this is a content profile, and actors from this profile are grouped with actors from a workflow
or transport profile, the Content Bindings reference column references any specifications for
mapping data from the content module into data elements from the workflow or transport
transactions.

In some cases, required groupings are defined as at least one of an enumerated set of possible
actors; this is designated by merging column one into a single cell spanning multiple potential
grouped actors. Notes are used to highlight this situation.

Section X.5 describes some optional groupings that may be of interest for security considerations
and Section X.6 describes some optional groupings in other related profiles.

300

Table X.3-1: mRFD - Required Actor Groupings

mRFD Actor	Actor to be grouped with	Reference	Content Bindings Reference
Form Filler	None		
Form Manager	None		
Data Responder	None		

X.4 mRFD Overview

The Mobile Retrieve Form for Data Capture Profile (mRFD) provides a method for gathering
data within a user's current application to meet the requirements of an external system. mRFD
305 supports the retrieval of a form from a form source, the display and completion of the form, and
the return of instance data from the display application to a receiving application.

In contrast with the Retrieve Form for Data Capture (RFD) Profile, this supplement is
lightweight, eschewing use of SOAP for RESTful exchanges. It profiles the existing SMART
approach to launching lightweight applications.

310 ### X.4.1 Concepts

X.4.1.1 Structural Differences Between Profiles

It is important to understand the structural differences between the RFD, SDC and mRFD
Profiles. RFD and SDC follow the same transactional structure but have different expectations of
the actors. Figure X.4.1.1-1 shows those shared transactions. mRFD has a different transactional
315 structure. Figure X.4.1.1-2 shows those transactions.
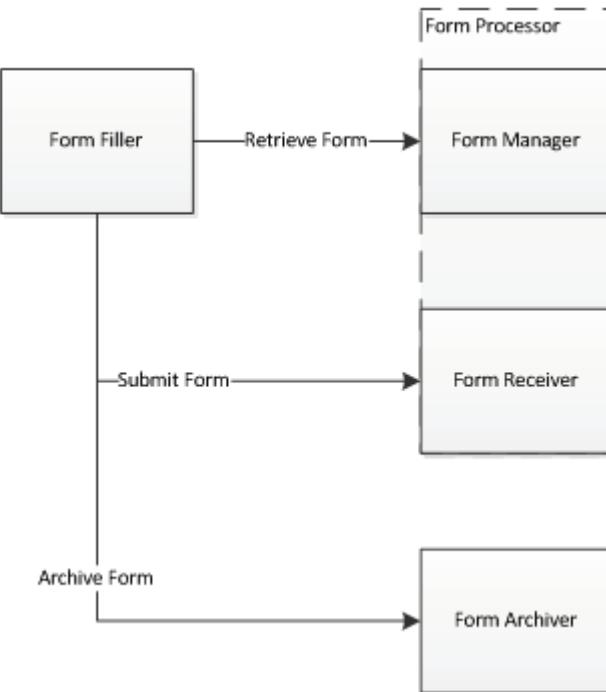
Figure X.4.1.1-1: Transactional structure of RFD and SDC
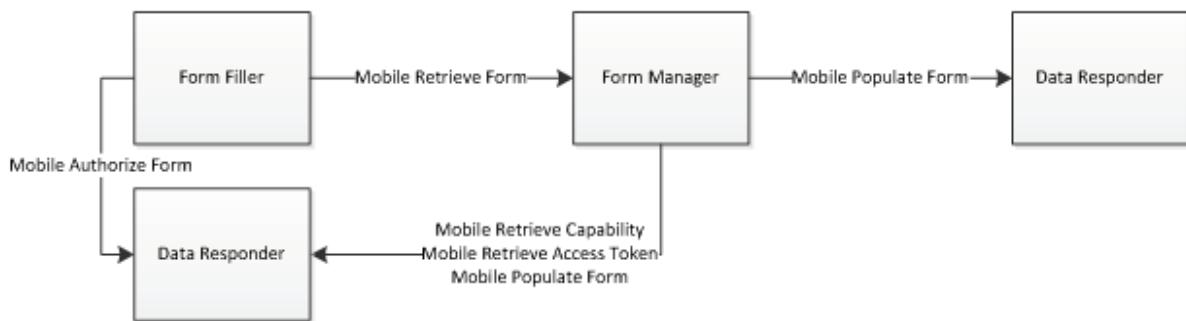
Figure X.4.1.1-2: Transactional structure of mRFD

320   The Retrieve Form and Mobile Retrieve Form transactions both serve the same purpose. They
both serve as a request from the Form Filler system to get a form. When the form is received
back by the Form Filler, an end user in that system is able to complete any missing form
information.

How information is pulled into the form before the Form Filler user gets access to it is described
325   in X.4.1.2. What additional actions are taken by the actors is discussed in Section X.4.1.3.

X.4.1.2 Prepopulation, Autopopulation and Querypopulation

"Population" in this context refers to the action of automatically filling in form fields. It is a method to reduce end user burden by having form fields already completed with known data before end user intervention. The three different approaches (pre-, auto-, and query-) are used in different situations and require different onus on the actors and transactions. The outcome of all three situations will look similar to the end user in the Form Filler system, who simply sees a form that is already partially complete.

X.4.1.2.1 Prepopulation

Prepopulation is predominantly used in RFD when sending a URI. The Retrieve Form transaction in this situation includes clinical content, communicating data between the Form Filler and the Form Manager/Processor. This is usually in the form of a CDA document. The Form Manager/Processor takes the action of parsing that information and filling out the necessary fields in the form. The Form Manager/Processor then returns the form URI to the Form Filler. The Form Filler presents the form to the end user.

X.4.1.2.2 Autopopulation

Autopopulation is predominantly used in SDC when not sending a URI. The Retrieve Form transaction in this situation does not need to include clinical content, merely being a request for structured form data. The Form Manager/Processor responds with a structured representation of a form. The Form Filler receives this structured form and has action to take before display to an end user. The Form Filler interprets the fields in the structured form to match them against data in known data sources, such as a local database. Wherever there is known data, the Form Filler populates the data into the form. Once the form is populated, the form is presented to the end user.

X.4.1.2.3 Querypopulation

Querypopulation is used in mRFD. The Mobile Retrieve Form transaction includes key resource identifiers, but no clinical data. The Form Manager receives the Mobile Retrieve Form Request message and initiates data gathering steps. It sends Mobile Populate Form requests to any systems that are known and trusted to have data appropriate to the form in question. Upon receipt of that information, the Form Manager populates the necessary data into a URI. That URI is then returned to the Form Filler. The Form Filler presents the form to the end user.

X.4.1.2.4 Which Approach to Use

Which approach to use depends on the needs of the individual use case.

- Prepopulation
  - Good fit for Form Fillers that can already create CDA documents.

360

- Good fit if there is a strong trust relationship between the Form Filler and Form Manager, where there are no concerns that the Form Manager may receive broad and irrelevant data sets within the CDA document.

- Burden placed on the Form Manager to perform population of the form.

365

- Limited by which CDA documents the Form Filler can create and what data lives within those CDA documents.

- Autopopulation

- Good fit for systems where no data should be sent outside of the Form Filler except for that which is required by the form.

370

- Good fit for Form Fillers that need a strong, internal record of what form data ended up being autopopulated and what form data was manually populated or modified.

- Burden placed on the Form Filler, which needs to interpret and parse structured form data.

- Limited by intelligence of the Form Filler. Every time a new field is needed by a form, there is no guarantee that the Form Filler understands that element.

375

- Querypopulation

- Good fit for systems requiring lightweight transactions.

- Good fit for environments where clinical data transactions need to be precise to the data elements involved.

380

- Good fit for environments with multiple sources of data that can serve the Data Responder role.

- Good fit for environments where each actor needs a strong, internal audit trail of what data was transferred for form population.

- Burden placed on the Form Manager to maintain relationships with relevant Data Responder systems.

385

- Limited by which resources are supported by the Data Responders.

X.4.1.2.5 Side by Side Workflow Comparison

Below is a side by side workflow comparison. The columns represent different profile options. The three column wide rows represent shared steps between each option.

390 **Table X.4.1.2.5-1: RFD, SDC and mRFD Workflow Comparison**

Prepopulation via RFD or SDC URI	Autopopulation via SDC XML	Querypopulation via mRFD
End user determines that they need to complete a form.		
• Form Filler builds a relevant CDA document for inclusion as prepopulation data. • Form Filler initiates Retrieve Form Request.	• Form Filler initiates Retrieve Form Request.	• Form Filler initiates Mobile Retrieve Form Request. • Authorization steps occur including Mobile Retrieve Capability, Mobile Authorize Form and Mobile Retrieve Access Token.
Form Manager/Processor receives the request for a form.		
• Form Manager/Processor parses the information from the CDA document to complete the form. • Form Manager/Processor generates a URI for completion of remaining form data.	• Form Manager/Processor generates the XML package representing the codified form structure.	• Form Manager initiates Mobile Populate Form Requests against relevant Data Responder systems. • Form Manager uses the content of those messages to populate the form. • Form Manager generates a URI for completion of remaining form data.
Form Manager(/Processor) sends the form back to the Form Filler.		
• Form Filler launches the form for an end user to complete.	• Form Filler parses the structured XML from the form to determine which fields can be pulled from known data sources. • Form Filler renders the received form definition, including the population information.	• Form Filler launches the form for an end user to complete.
End user now has the form, already partially populated.		

X.4.1.3 Data Submission

Data submission is a topic profiled by RFD URI and SDC, but it is not profiled by mRFD.

In RFD, when the URI is launched by the Form Filler, control of the form content and form
actions has already been determined by the Form Manager/Processor. Any actions that occur

395   within the form will appear from the IP address of the Form Filler. Typically, the form will have a button that submits the completed data. That completed form data is sent to a Form Receiver/Processor as part of a Submit Form transaction.

In SDC, the form is hosted locally in the Form Filler. When submission occurs, the Form Filler will package the form data into an SDC Submit Form Response and send it along to the Form

400   Receiver/Processor.

In mRFD, it is expected that the same sorts of actions are likely to occur. The form information, once completed in the URL, needs to be passed back to whatever system needs the information. As there are plenty of options available for data submission from a web page, that submission is not profiled by mRFD and can be accomplished however it is designed by the Form Manager.

405   ## X.4.1.4 Additional Data Gathering

For RFD URI using prepopulation, no additional transactions are expected after the form has been submitted. It may be possible for a Form Receiver/Processor to initiate data gathering steps using identifying information in the form, but for most situations, codified links to the initial prepopulation data have been abstracted away from the Receiver/Processor. In order for more

410   data to be sent, the process needs to begin again from the Form Filler side.

For SDC using autopopulation, no additional transactions are expected after the form has been submitted. Because the Form Receiver/Processor only has access to the form information, codified links to the initial autopopulation data has been abstracted away. In order for more data to be sent, the process needs to begin again from the Form Filler side.

415   For mRFD using querypopulation, additional Mobile Populate Form transactions can occur after the form has been submitted. The access token in the possession of the Form Manager allow that system to gather additional data by initiating additional queries against the preferred Data Responder. Additional Mobile Populate Form transactions can occur against other Data Responders known to the Form Manager. These may be used to check back when more

420   information has been added to a clinical chart, it may be used to see whether a condition has been appropriately treated a week later, or it may be used when a form requires updates and additional data should be retrieved for historic form submissions.

The structure of mRFD opens potentially important flexibility options that should be treated with care, as the authority of the Form Manager/Processor may be different in scope than the authority

425   of the Form Filler. If uncertainty exists in a given implementation, a Risk Assessment would be advisable to mitigate those risks.

Note that where an RFD exchange may send a CDA document as prepopulation content, it is possible for a Form Manager to request a CDA document via a Mobile Populate Form transaction, if that is indeed necessary for form population.

430   ## X.4.2 Use Cases

X.4.2.1 Use Case #1: Research Enrollment

This use case encompasses a researcher within an EMR that wishes to transfer some clinical data about their subject to the RMS for use in an open research study.

X.4.2.1.1 Research Enrollment Use Case Description

435   A clinical user in North Carolina is using their tablet for mobile EMR access while interacting with patients. While doing so, the clinician identifies that the patient fits both the requirements and interest level to be enrolled in a specific study within the RMS.

Note: Study criteria may be managed with other QRPH profiles like Research Matching (RM).

440   The clinician uses their tablet to request a form from the RMS. This form returns and is displayed to the clinician partially populated with data from the EMR.

It also includes prompts for additional fields required by this particular study that were not available in the EMR population data or via the query to the EMR. This information may be data that is not captured in the EMR but is necessary for the study, or it may be data that is simply not
445   included in the query content. The clinician completes the form on their tablet to flesh out the initial registration of the patient in the study.

Note: Enrollment may be managed with other QRPH profiles like Clinical Research Process Content (CRPC).

X.4.2.1.2 Research Enrollment Process Flow

450   In this use case, the EMR is serving as the role of the Form Filler and Data Responder. The RMS is hosting the form as the Form Manager.
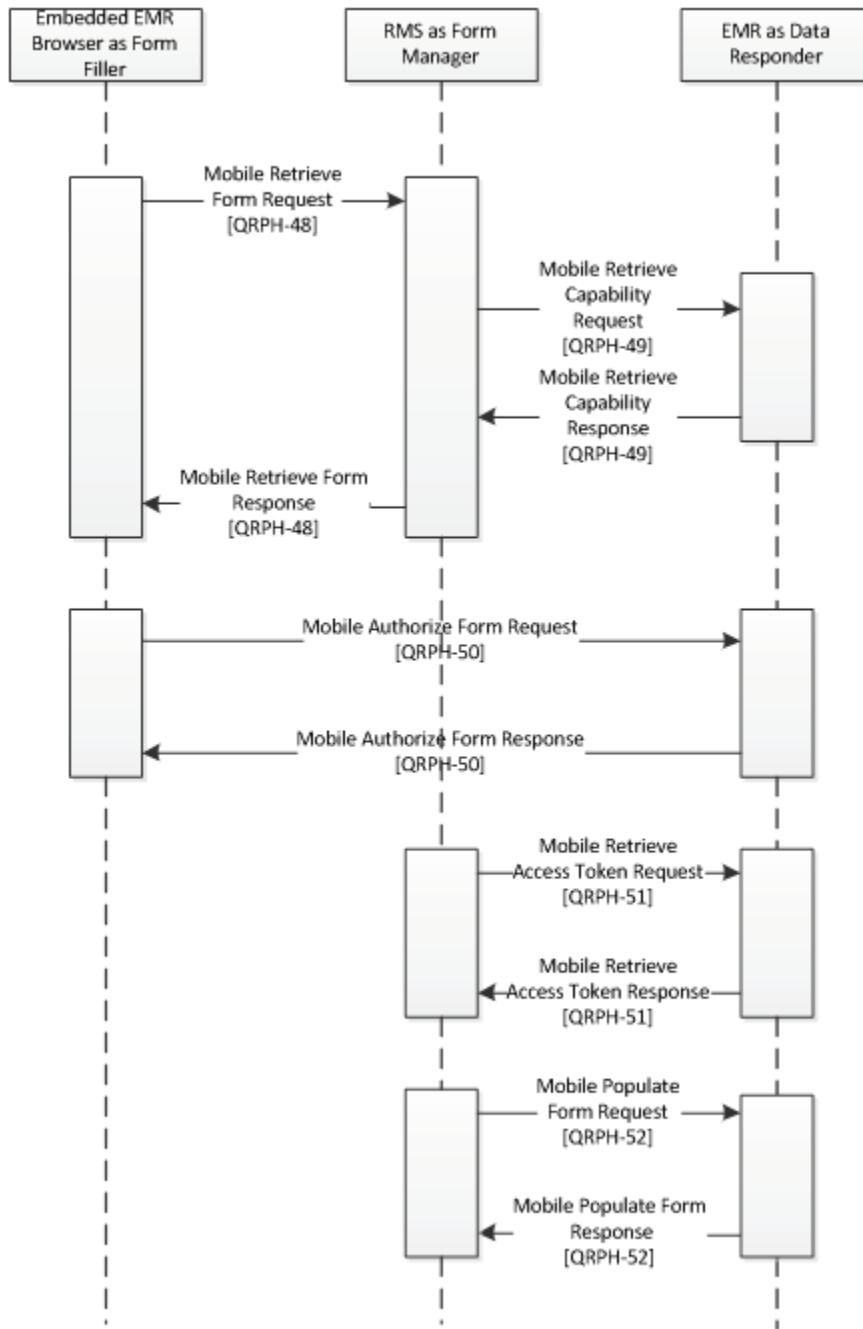
Figure X.4.2.1.2-1: Use Case 1 - Research Enrollment Process Flow

455

Pre-conditions:

This module would be used when the researcher in the EMR identifies that clinical patient data should be transmitted to the RMS for the sake of a research study on that subject.

460 Main Flow:

1. Pre-Conditions are met. Subject is enrolled in study and clinical data exists that needs to be transferred to fill out the basic study parameters.

2. Researcher initiates exchange in the browser embedded in the EMR system. Authorization steps occur.

465
    a. The embedded Browser initiates a Mobile Retrieve Form Request.

    b. The RMS initiates a Mobile Retrieve Capability Request and receives back the Mobile Retrieve Capability Response.

    c. The RMS redirects the Browser with a Mobile Retrieve Form Response.

    d. The Browser initiates a Mobile Authorize Form Request against the EMR database
470   Data Responder.

    e. The EMR database Data Responder responds with a Mobile Authorize Form Response.

3. The Embedded EMR Browser redirects to the provided URL.

4. The RMS initiates data gathering steps.

475
    a. The RMS initiates a Mobile Retrieve Access Token Request against the EMR database Data Responder.

    b. The EMR database Data Responder grants access via a Mobile Retrieve Access Token Response, which includes an access token.

    c. The RMS sends one or more Mobile Populate Form Requests to the EMR database
480   Data Responder.

    d. The EMR responds to each request with a Mobile Populate Form Response.

5. The RMS uses the retrieved data to populate the URL that was provided to the Embedded EMR Browser.

6. User in the embedded EMR completes form, filling in any missing information. User in
485 EMR submits form via the URL.

Post-conditions:

After the flow is completed, the RMS has the necessary information for the initial data elements in the study. It has resource identification information in case additional information is needed after the fact or in case it needs to query for updates later.

X.4.2.2 Use Case #2: Public Health Enrollment

This use case encompasses a provider within an EMR that wishes to transfer some clinical data about their patient to a Public Health information portal in line with jurisdictional requirements.

X.4.2.2.1 Public Health Enrollment Use Case Description

A public health provider in Vietnam is in a remote location where they see patients. They are using a web browser on their phone to access a view of EMR data. While doing so, they recognize that the patient they are working with has measles. This necessitates a notification to Public Health.

The provider uses their phone to request a form from Public Health using mRFD. This form returns and is displayed to the provider partially populated with:

- Data populated from the EMR

- Data populated from the Vaccination Registry in Vietnam with respect to this patient's measles vaccination history.

It also includes prompts for additional fields required by this particular case report form that were not available in the EMR population data or via the query to the EMR. This information may be data that is not captured in the EMR but is necessary for the report, or it may be data that is simply not included in the query content. The provider completes the form on their phone to flesh out the initial registration of the Public Health incident.

X.4.2.2.2 Public Health Enrollment Process Flow

In this use case, the EMR is serving as the role of the Form Filler. The Public Health Information portal is hosting the form as the Form Manager. The EMR is the preferred Data Responder. The Vaccination Registry is an additional Data Responder.
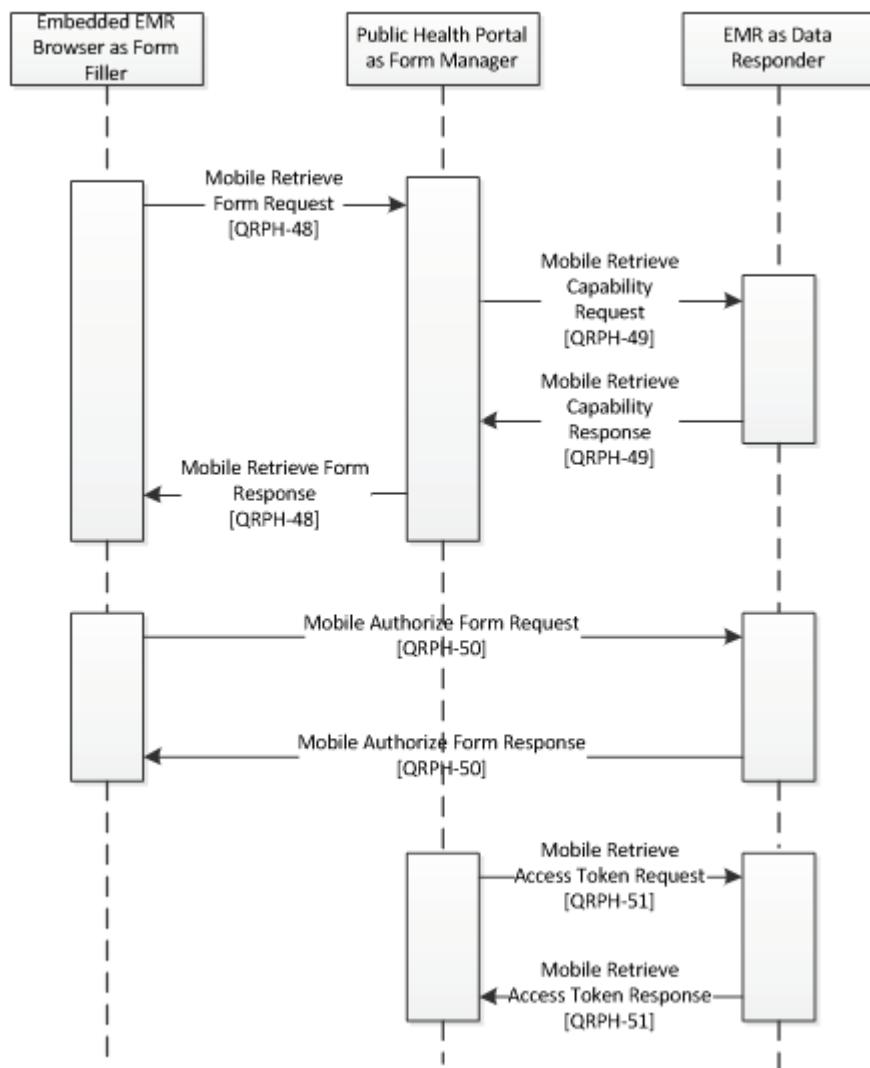
Figure X.4.2.2.2-1: Use Case 2 - Public Health Enrollment Authorization Process Flow

515
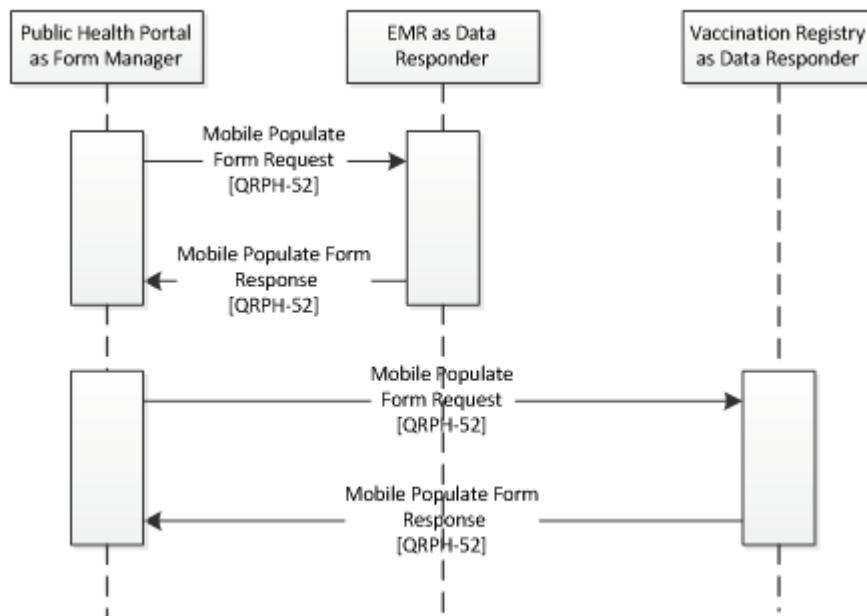
Figure X.4.2.2.2-2: Use Case 2 - Public Health Enrollment Form Population Process Flow

Pre-conditions:

This module would be used when the provider in the EMR identifies that patient data should be
520 transmitted to Public Health in line with jurisdictional requirements.

Main Flow:

1. Pre-Conditions are met. Patient has been identified as needing to have information submitted to Public Health and that information has been documented in the EMR.

525 2. Provider initiates exchange in the browser embedded in the EMR system. Authorization steps occur.

   a. The embedded Browser initiates a Mobile Retrieve Form Request.

   b. The Public Health Portal initiates a Mobile Retrieve Capability Request and receives back the Mobile Retrieve Capability Response.

530 c. The Public Health Portal redirects the Browser with a Mobile Retrieve Form Response.

   d. The Browser initiates a Mobile Authorize Form Request against the EMR database Data Responder.

   e. The EMR database Data Responder responds with a Mobile Authorize Form
535 Response.

f. The Public Health Portal initiates a Mobile Retrieve Access Token Request against the EMR database Data Responder.

g. The EMR database Data Responder grants access via a Mobile Retrieve Access Token Response, which includes an access token.

540   3. The embedded EMR Browser redirects to the provided URL.

4. Authorization steps between the Form Manager and the Vaccination Registry Data Responder occur.

    a. These authorization steps are out of the scope of the mRFD Profile, but may be accomplished by existing IHE profiles such as the IUA (Internet User Authentication) 545   profile. Under such circumstances, an external token authority may be used that is trusted by both parties.

5. The Public Health Portal initiates data gathering steps with the EMR.

    a. The Public Health Portal sends one or more Mobile Populate Form Requests to the EMR database Data Responder.

550   b. The EMR responds to each request with a Mobile Populate Form Response.

6. The Public Health Portal initiates data gathering steps with the Vaccination Registry.

    a. The Public Health Portal sends one or more Mobile Populate Form Requests to the Vaccination Registry Data Responder.

    b. The Vaccination Registry responds to each request with a Mobile Populate Form 555   Response.

7. The Public Health Portal uses the retrieved data to populate the URL that was provided to the Embedded EMR Browser.

8. User in the embedded EMR completes form, filling in any missing information. User in EMR submits form via the URL.

560

Post-conditions:

After the flow is completed, the Public Health Portal has the necessary information for the initial data elements collected in this incident. It has resource identification information in case additional information is needed after the fact or in case it needs to query for updates later.

565   X.5 mRFD Security Considerations

There are many security and privacy concerns with mobile devices, including lack of physical control. Many common information technology uses of HTTP, including REST, are accessing far less sensitive information than health documents. These factors present an especially difficult challenge for the security model. It is recommended that application developers perform a Risk 570   Assessment in the design of the applications, and that Organization responsible for the

operational environment using mRFD perform Risk Assessments in the design and deployment of the operational environment. See FHIR®[2] DSTU2 Security:

- http://hl7.org/fhir/DSTU2/security.html

575　A resource server should not return any patient information unless proper authentication and communications security have been proven.

There are many reasonable methods of securing interoperability transactions. These security models can be layered in without modifying the characteristics of the mRFD Profile transactions. The use of TLS is encouraged, specifically the use of the ATNA Profile. User authentication on mobile devices is encouraged using Internet User Authorization (IUA) Profile. The network
580　communication security and user authentication are layered in at the HTTP transport layer and do not modify the interoperability characteristics defined in the mRFD Profile.

The Security Audit logging (e.g., ATNA) is recommended. Support for ATNA-based audit logging on the mobile health device may be beyond the ability of this constrained environment.

For example, the client (Document Source or Document Consumer) need only support http
585　interactions using JSON encoding, while ATNA Audit Message transaction requires SYSLOG protocol and XML encoding. However, when grouped with XDS actors, the whole system must comply with the ATNA requirement mandated in XDS. For this reason, the use of ATNA Audit Logging is not mandated. This would mean that the Organization responsible for the operational environment must choose how to mitigate the risk of relying only on the service side audit
590　logging.

The QRPH-51 and QRPH-52 transactions may include patient identifying information. This pattern does present a risk when using typical web server audit logging of URL requests, and browser history. In both of these cases the URL with the patient identity is clearly visible. These risks should be mitigated in system or operational design.

595　**X.5.1 Consistent Time (CT)**

In order to address identified security risks, all actors in mRFD SHOULD be grouped with Consistent Time (CT) Profile - Time Client. This grouping will assure that all systems have a consistent time clock to assure a consistent timestamp for audit logging and form accuracy.

X.5.2 Audit Trail and Node Authentication (ATNA)

600　Some mRFD transactions include clinical content related to the information subject. In those cases, it is anticipated that transfers of Personal Health Information (PHI) will be protected. The IHE ITI Audit Trail and Node Authentication (ATNA) Profile SHOULD be implemented by the Form Manager and Data Responder Actors to protect node-to-node communication and to produce an audit trail of the PHI related actions when they exchange messages, through other
605　private security mechanisms MAY be used to secure content within enterprise managed systems.

---

[2] FHIR is the registered trademark of Health Level Seven International.

The Form Filler MAY implement ATNA, or other methods may be utilized to ensure the security of the user connection.

X.5.3 User Authorization

For security purposes, when sending information specifically to vital records Electronic Registration Systems, systems will also need to know the identity of the user and the location to identify the data source.

The OpenID Connect identity layer SHOULD be utilized to support this implementation. (http://openid.net/connect/). The OpenID Connect identity layer is compatible with the Internet User Authentication (IUA) Profile.

X.5.4 Consent

In some jurisdictions, consent may be needed to provide this information to public health. For these cases, the IHE ITI BPPC or the IHE ITI APPC Integration Profile SHOULD be used to enable this consent management.

X.5.5 Additional RESTful Query Considerations

A major difference between RFD and mRFD is the flexibility for the Data Responder to be a different system that is outside of the Form Filler and Manager relationship.

In the RFD Profile, the Form Filler needs to document and complete patient information in order for form prepopulation to occur. In the case of mRFD, the onus for searching for querypopulation data falls upon the Form Manager as they initiate Mobile Populate Form Requests. This may mean that populated data presented to the end user in the Form Filler system includes information that was not previously available to the end user in the Form Filler system.

This opens potentially important flexibility options that should be treated with care, as the authority of the Form Manager may be different in scope than the authority of the Form Filler. If uncertainty exists in a given implementation, a Risk Assessment would be advisable to mitigate those risks.

X.6 mRFD Cross Profile Considerations

Not applicable.

Volume 2 – Transactions

635 ## 3.48 Mobile Retrieve Form [QRPH-48]

This section corresponds to Transaction QRPH-48 of the IHE Technical Framework. Transaction QRPH-48 is used by the Form Filler and Form Manager Actors.

3.48.1 Scope

This transaction is used to request a form.

640 ### 3.48.2 Actor Roles
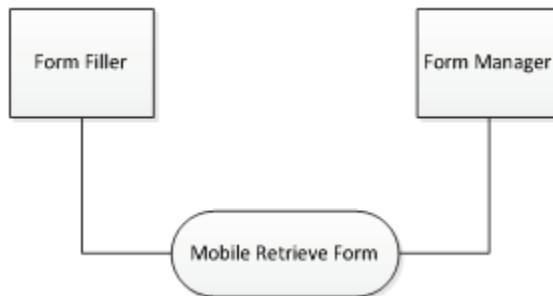
Figure 3.48.2-1: Mobile Retrieve Form Use Case Diagram

Table 3.48.2-1: Mobile Retrieve Form Actor Roles

Actor:	Form Filler
Role:	Represents a system that needs to complete a form. Initiates a request for that form.
Actor:	Form Manager
Role:	Contains forms and takes responsibility for populating those forms with available clinical data.

645 ### 3.48.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard http://hl7.org/fhir
IETF RFC 2616	Hypertext Transfer Protocol - HTTP/1.1
IETF RFC 7540	Hypertext Transfer Protocol - HTTP/2
IETF RFC 3986	Uniform Resource Identifier (URI): Generic Syntax

IETF RFC 4627	The application/json Media Type for JavaScript Object Notation (JSON)
IETF RFC 6585	Additional HTTP Status Codes
SMART on FHIR	https://hl7.org/fhir/ihe/links/apps

3.48.4 Interaction Diagram
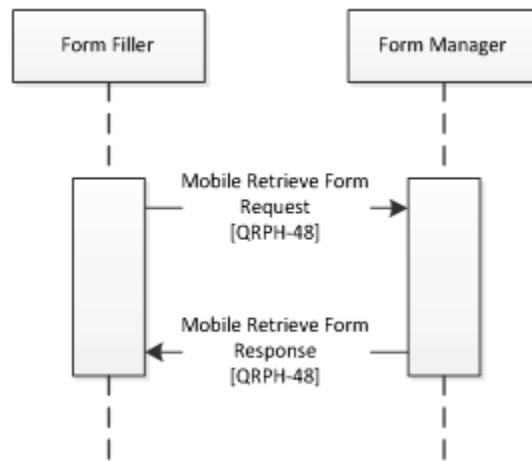
650 3.48.4.1 Mobile Retrieve Form Request

This message uses the HTTP GET method on the target endpoint to retrieve and launch a URL
form.

3.48.4.1.1 Trigger Events

This method is invoked when a user in the Form Filler browser needs to retrieve a URL for form
655 completion.

3.48.4.1.2 Message Semantics

The Form Filler executes an HTTP GET against the Form Manager's URL.

```
https://[Manager
660  URL]?launch=[launch_token]&iss=https://[Responder FHIR Base URL]
```

3.48.4.1.2.1 Mobile Retrieve Form Request Parameters

```
Manager URL [1..1]
```

Represents an https secure URL for the form being launched. This is also known as the application's Launch URL.

```
launch_token [1..1]
```

Represents a SMART on FHIR launch token. This token will be used to transfer context information between the actors. Acquisition of this token is not profiled here, and may be provided by a direct connection to the preferred Data Responder.

```
Responder FHIR Base URL [1..1]
```

Represents a FHIR base URL where a primary/expected Data Responder endpoints are available.

3.48.4.1.3 Expected Actions

The Form Manager will process the query and provide a redirect URL for the Data Responder in need of authorization.

3.48.4.2 Mobile Retrieve Form Response

This message is an HTTP redirect. It indicates to the browser that a different URL needs to be launched.

3.48.4.2.1 Trigger Events

This message is generated when a Form Manager receives a Mobile Retrieve Form Request.

3.48.4.2.2 Message Semantics

The Form Manager responds by redirecting the Form Filler. This may occur with a standard HTTP 302 status code to indicate a redirect, or it may involve javascript's window.location.

```
HTTP/1.1 302 Found
Location: https://[Responder Authorize URL]?
response_type=[response_type]&
client_id=[client_id]&
redirect_uri=https://[redirect_uri]
```

3.48.4.2.2.1 Mobile Retrieve Form Response Parameters

```
Responder Authorize URL [1..1]
```

The Secure FHIR Authorize URL to the Data Responder's endpoint as received in the
Mobile Retrieve Capability Request.

`response_type [1..1]`

695   Required - Fixed value: code.

`client_id [1..1]`

     Required - The client's identifier.

`redirect_uri [1..1]`

     Required - Must match one of the client's pre-registered redirect URIs.

700   `launch_token [0..1]`

     Optional - this must match the launch value received from the Form Filler as
[launch_token] in Mobile Retrieve Form Response.

`scope [1..1]`

     Required - Must describe the access that the app needs, including clinical data scopes like
705   patient/*.read, openid and profile and either

- launch

  - A value indicating that the app wants to receive already-established launch
    context details from the Form Filler.

- launch/patient

710   - A set of launch context requirements which asks the Form Filler to establish
    context on your behalf.

`state [1..1]`

     Required - An opaque value used by the client to maintain state between the request and
callback. The authorization server includes this value when redirecting the user-agent
715   back to the client. The parameter SHALL be used for preventing cross-site request
forgery or session fixation attacks.

`Responder FHIR Base URL [1..1]`

     Required - URL of the Data Responder resource server from which the Form Manager
wishes to retrieve FHIR data. This parameter prevents leaking a genuine bearer
720   access_token to a counterfeit resource server. This was received by the Form Manager in
the Mobile Retrieve Form Request.

3.48.4.2.3 Expected Actions

The Form Filler will process the redirect and use it to initiate a Mobile Authorize Form Request
against the Form Manager.

725 Note that there may be cases where the Data Responder declines to authorize the form. If that is the case, the URL SHALL still be returned to the Form Filler so that an appropriate error can be displayed to the end user.

3.48.5 Security Considerations

730 No Patient Health Information is transferred as part of the Mobile Retrieve Form transaction. HTTPS SHOULD be used as a method to secure the connection between the Form Filler and Form Manager.

3.48.5.1 Security Audit Considerations

No Patient Health information is transferred in this transaction, but tracking of authorization requests may be important for security purposes. In that way, the Security audit criteria are
735 similar to those for the Retrieve Form for Data Capture [ITI-34] transaction. The Form Manager SHOULD generate an equivalent to the audit message defined in the Clinical Research Document (CRD) Profile 5.Z3.1.2.

3.49 Mobile Retrieve Capability [QRPH-49]

This section corresponds to Transaction QRPH-49 of the IHE Technical Framework. Transaction
740 QRPH-49 is used by the Form Manager and Data Responder Actors.

3.49.1 Scope

This transaction is used to request a statement of behaviors from a Data Responder..

3.49.2 Actor Roles
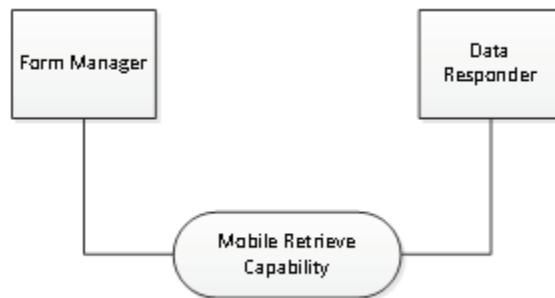
745

Figure 3.49.2-1: Mobile Retrieve Capability Use Case Diagram

Table 3.49.2-1: Mobile Retrieve Capability Actor Roles

Actor:	Form Manager
Role:	Represents a system that needs to populate a form. To do so, it needs to understand the supported behaviors of the Data Responder.
Actor:	Data Responder
Role:	Contains form data.

3.49.3 Referenced Standards

750

HL7 FHIR	HL7 FHIR standard http://hl7.org/fhir
IETF RFC 2616	Hypertext Transfer Protocol - HTTP/1.1
IETF RFC 7540	Hypertext Transfer Protocol - HTTP/2
IETF RFC 3986	Uniform Resource Identifier (URI): Generic Syntax
IETF RFC 4627	The application/json Media Type for JavaScript Object Notation (JSON)
IETF RFC 6585	Additional HTTP Status Codes
SMART on FHIR	https://hl7.org/fhir/ihe/links/apps

3.49.4 Interaction Diagram
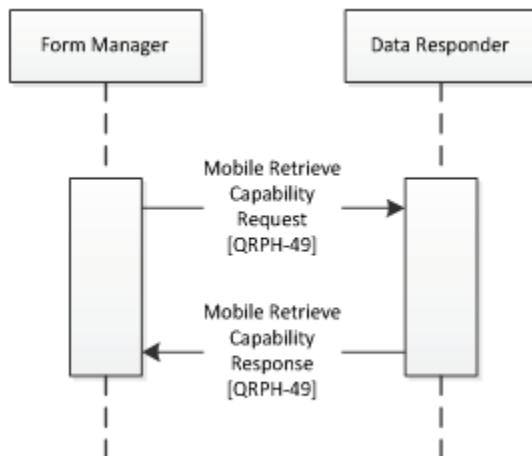
3.49.4.1 Mobile Retrieve Capability Request

755 This message uses the HTTP GET method on the target endpoint to convey desire to retrieve a capability statement.

3.49.4.1.1 Trigger Events

This method is invoked when a Form Manager needs to retrieve behavior information for form completion.

760 3.49.4.1.2 Message Semantics

The Form Manager executes an HTTP GET against the Data Responder's URL.

```
https://[Responder Base URL]/metadata
```

3.49.4.1.2.1 Mobile Retrieve Capability Request Parameters

765 Responder Base URL

> Represents a FHIR base URL.

3.49.4.1.3 Expected Actions

The Data Responder will process the query and provide a statement of supported behaviors for the Form Manager to use to retrieve resource endpoints.

770 The FHIR standard provides encodings for responses as either XML or JSON. The Data Responder SHALL accept both media types application/json+fhir and application/xml+FHIR. The Form Manager SHALL support one and may support both. See ITI TF-2x: Appendix Z.6 for details.

3.49.4.2 Mobile Retrieve Capability Response

775 This message contains a statement of supported behaviors. It may be in XML or JSON.

3.49.4.2.1 Trigger Events

This message is generated when a Data Responder receives a Mobile Retrieve Capability Request.

3.49.4.2.2 Message Semantics

780 The Data Responder responds with a FHIR resource indicating the capacities supported by the Data Responder..

> {

```
       "resourceType": "<Resource Type>",
       "status" : "<status>",
785    "date" : "<date>",
       "kind" : "<Conformance Statement Kind>",
       "fhirVersion" : "<FHIR Version>",
       "acceptUnknown": "<UnknownContentCode>",
       "format": "<formats accepted>",
790    "rest": [{
           "mode": "<RestfulConformanceMode>"
           "security": {
             "service": [
               {
795              "coding": [
                   {
                     "system": "http://hl7.org/fhir/restful-security-
       service",
                     "code": "SMART-on-FHIR"
800                }
                 ],
                 "text": "OAuth2 using SMART-on-FHIR profile (see
       http://docs.smarthealthit.org)"
               }
805        ],
           "extension": [{
             "url": "http://fhir-
       registry.smarthealthit.org/StructureDefinition/oauth-uris",
             "extension": [{
810            "url": "token",
               "valueUri": "https://my-server.org/[Responder's
       Access Token URL]"
             },{
               "url": "authorize",
```

```
815              "valueUri": "https://my-server.org/[Responder's
         Authorize URL]"
                 }]
               }]
             }]
820        }]
         }]
       }
```

3.49.4.2.2.1 Mobile Retrieve Capability Response Parameters

The Data Responder may respond with the following URL parameters as part of the SMART on
825 FHIR extension. The Form Manager SHALL be capable of processing them.

`Resource Type [1..1]`

> Required - the type of resource being used to transmit capability. For FHIR STU2, this
> SHALL be a Conformance resource. For FHIR STU3, this SHALL be a
> CapabilityStatement resource.

830 `Responder's Authorize URL [1..1]`

> Required - valueUri indicating the OAuth2 "authorize" endpoint for this FHIR server.
> This will be returned to the Form Filler in the Mobile Retrieve Form Response.

`Responder's Access Token URL [1..1]`

> Required - valueUri indicating the OAuth2 access "token" endpoint for this FHIR server.

835 `register [0..1]`

> Optional - valueUri indicating the OAuth2 dynamic registration endpoint for this FHIR
> server, if supported.

`manage [0..1]`

> Optional - valueUri indicating the user-facing authorization management workflow entry
840 > point for this FHIR server,

3.49.4.2.3 Expected Actions

The Form Manager will process the statement of behavior and use it to initiate a Mobile Retrieve
Access Token Request.

The FHIR standard provides encodings for responses as either XML or JSON. The Data
845 Responder SHALL accept both media types application/json+fhir and application/xml+FHIR.
The Form Manager SHALL support one and may support both. See ITI TF-2x: Appendix Z.6 for
details.

3.49.5 Security Considerations

No Patient Health Information is transferred as part of the Mobile Retrieve Capability
850   transaction. HTTPS SHOULD be used as a method to secure the connection between the Form
Filler and Form Manager.

3.49.5.1 Security Audit Considerations

No Patient Health information is transferred in this transaction, but tracking of authorization
requests may be important for security purposes. In that way, the Security audit criteria are
855   similar to those for the Retrieve Form for Data Capture [ITI-34] transaction. The Form Manager
SHOULD generate an equivalent to the audit message defined in the Clinical Research
Document (CRD) Profile 5.Z3.1.2. The Data Responder SHOULD generate an equivalent to the
audit message defined in the Clinical Research Document (CRD) Profile 5.Z3.1.1.

3.50 Mobile Authorize Form [QRPH-50]

860   This section corresponds to Transaction QRPH-50 of the IHE Technical Framework. Transaction
QRPH-50 is used by the Form Manager and Data Responder Actors.

3.50.1 Scope

This transaction is used to request authorization for the FHIR resource server from a Data
Responder.

865   ### 3.50.2 Actor Roles
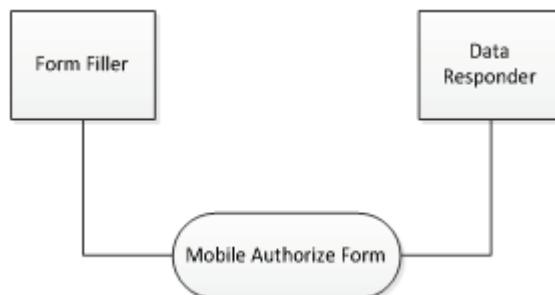
Figure 3.50.2-1: Mobile Authorize Form Use Case Diagram

Table 3.50.2-1: Mobile Authorize Form Actor Roles

Actor:	Form Filler
Role:	Represents a system that needs to fill in a form.
Actor:	Data Responder
Role:	Contains form data.

870 ### 3.50.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard http://hl7.org/fhir
IETF RFC 2616	Hypertext Transfer Protocol - HTTP/1.1
IETF RFC 7540	Hypertext Transfer Protocol - HTTP/2
IETF RFC 3986	Uniform Resource Identifier (URI): Generic Syntax
IETF RFC 4627	The application/json Media Type for JavaScript Object Notation (JSON)
IETF RFC 6585	Additional HTTP Status Codes
OpenID	http://openid.net/connect/
SMART on FHIR	https://hl7.org/fhir/ihe/links/apps

3.50.4 Interaction Diagram
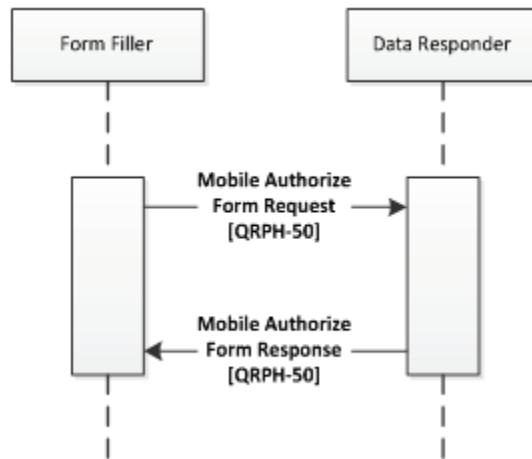
875 ## 3.50.4.1 Mobile Authorize Form Request

This message uses the HTTP GET method on the target endpoint to retrieve authorization for
resource access.

3.50.4.1.1 Trigger Events

This method is invoked when a Form Filler needs to retrieve authorization for data gathering
880 efforts for form completion.

3.50.4.1.2 Message Semantics

The Form Filler executes an HTTP GET against the preferred Data Responder's Authorization URL.

```
885   https://[Responder Base URL]/authorize?
      response_type=[response_type]&
      client_id=[client_id]&
      redirect_uri=https://[redirect_uri]
```

3.50.4.1.2.1 Mobile Authorize Form Request Parameters

890   The Form Filler SHALL perform an HTTP GET at the URL provided in the Mobile Retrieve Form Response message.

3.50.4.1.3 Expected Actions

The Data Responder will process the query and provide a redirect URL for the Form Filler to launch.

895   The FHIR standard provides encodings for responses as either XML or JSON. The Data Responder SHALL accept both media types application/json+fhir and application/xml+FHIR. The Form Filler SHALL support one and may support both. See ITI TF-2x: Appendix Z.6 for details.

3.50.4.2 Mobile Authorize Form Response

900   This message is an HTTP redirect. It indicates to the browser that a different URL needs to be launched.

3.50.4.2.1 Trigger Events

This message is generated when a Data Responder receives a Mobile Retrieve Form Request.

3.50.4.2.2 Message Semantics

905   The Data Responder responds by redirecting the Form Filler. This may occur with a standard HTTP 302 status code to indicate a redirect, or it may involve javascript's window.location.

In addition, a GET parameter on the redirect will be the authorization code that was obtained from the Data Responder.

```
910   HTTP/1.1 302 Found
      Location: [redirect_uri]
```

3.50.4.2.2.1 Mobile Authorize Form Response Parameters

`redirect_uri [1..1]`

915

New location is a secure URL to launch for the end user to see the form content. As received by Mobile Authorize Form Request.

`authorization_code [1..1]`

A GET parameter on the redirect is the authorization code being provided to the Form Manager

`state [1..1]`

920

A GET parameter on the redirect that is the same as the state parameter earlier.

3.50.4.2.3 Expected Actions

The Form Filler will process the redirect.

The FHIR standard provides encodings for responses as either XML or JSON. The Data Responder SHALL accept both media types application/json+fhir and application/xml+FHIR.

925 The Form Filler SHALL support one and may support both. See ITI TF-2x: Appendix Z.6 for details.

Note that there may be cases where the Data Responder declines to authorize the form. If that is the case, the URL SHALL still be returned to the Form Filler so that an appropriate error can be displayed to the end user when the redirect is processed back to the Form Manager.

930 **3.50.5 Security Considerations**

No Patient Health Information is transferred as part of the Mobile Authorize Form Response. HTTPS SHOULD be used as a method to secure the connection between the Form Filler and Data Responder.

3.50.5.1 Security Audit Considerations

935 No Patient Health information is transferred in this transaction, but tracking of authorization requests may be important for security purposes. In that way, the Security audit criteria are similar to those for the Retrieve Form for Data Capture [ITI-34] transaction. The Data Responder SHOULD generate an equivalent to the audit message defined in the Clinical Research Document (CRD) Profile 5.Z3.1.1.

940 ### 3.51 Mobile Retrieve Access Token [QRPH-51]

This section corresponds to Transaction QRPH-51 of the IHE Technical Framework. Transaction QRPH-51 is used by the Form Manager and Data Responder Actors.

3.51.1 Scope

This transaction is used to request access for the FHIR resource server from a Form Manager.

945 ### 3.51.2 Actor Roles
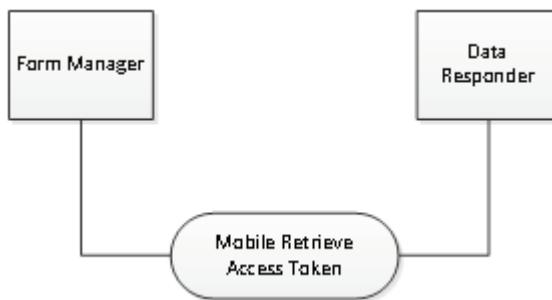
Figure 3.51.2-1: Mobile Retrieve Access Token Use Case Diagram

Table 3.51.2-1: Mobile Retrieve Access Token Actor Roles

Actor:	Form Manager
Role:	Represents a system that needs authorization in order to populate form data.
Actor:	Data Responder
Role:	Contains form data.

950 ### 3.51.3 Referenced Standards

HL7 FHIR	HL7 FHIR standard http://hl7.org/fhir
IETF RFC 2616	Hypertext Transfer Protocol - HTTP/1.1
IETF RFC 7540	Hypertext Transfer Protocol - HTTP/2
IETF RFC 3986	Uniform Resource Identifier (URI): Generic Syntax
IETF RFC 4627	The application/json Media Type for JavaScript Object Notation (JSON)
IETF RFC 6585	Additional HTTP Status Codes
SMART on FHIR	https://hl7.org/fhir/ihe/links/apps

3.51.4 Interaction Diagram
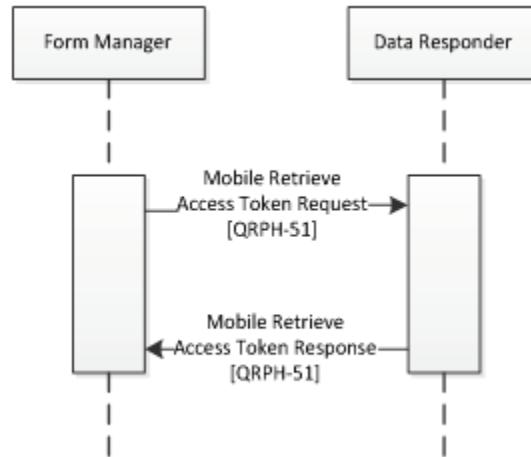
955 ## 3.51.4.1 Mobile Retrieve Access Token Request

This message uses the HTTP POST method on the target endpoint to convey desire to retrieve access.

3.51.4.1.1 Trigger Events

This method is invoked when a Form Manager needs to retrieve access for data gathering efforts
960 for form completion.

3.51.4.1.2 Message Semantics

The Form Manager executes an HTTP POST against the Data Responder's Access Token URL
from the Mobile Retrieve Capability Response.

965
```
POST /token HTTP/1.1

Host: ehr

Authorization: Basic

[client id : client secret]

Content-Type: application/x-www-form-urlencoded
```
970
```
grant_type=authorization_code&

code=[authorization_code]&

redirect_uri=[redirect]
```

3.51.4.1.2.1 Mobile Retrieve Access Token Request Parameters

975 The Form Manager MAY send the following parameters, and the Data Responder MAY be capable of processing them.

`client id : client secret [0..1]`

> Optional - A client ID and client secret may be sent to secure the client connection. This parameter is base64 encoded. Additional information is available here:
> 980 http://docs.smarthealthit.org/authorization/ .

`grant_type [1..1]`

> Required - Fixed value: authorization_code.

`authorization_code [1..1]`

> Required - Code that the app received from the authorization server.

985 `redirect_uri [1..1]`

> Required - The same redirect_uri used in the initial authorization request.

`client_id [0..1]`

> Optional - this value SHALL be included for public applications, but MAY be included for confidential applications.

990 ### 3.51.4.1.3 Expected Actions

The Data Responder will process the query and provide a Mobile Retrieve Access Token Response to the Form Manager.

The FHIR standard provides encodings for responses as either XML or JSON. The Data Responder SHALL accept both media types application/json+fhir and application/xml+FHIR. 995 The Form Manager SHALL support one and may support both. See ITI TF-2x: Appendix Z.6 for details.

3.51.4.2 Mobile Retrieve Access Token Response

This message returns an access token to the HTTP response.

3.51.4.2.1 Trigger Events

1000 This message is generated when a Data Responder receives a Mobile Retrieve Access Token Request.

3.51.4.2.2 Message Semantics

The Data Responder responds, granting or denying access.

> `{`

```
1005          "access_token": "[access_token]",

              "token_type": "Bearer",

              "expires_in": [expires],

              "scope": "[scope]"

      }

1010
```

3.51.4.2.2.1 Mobile Retrieve Access Token Response Parameters

The Data Responder MAY respond with the following parameters, and the Form Manager
SHALL be capable of processing them.

`access_token [1..1]`

1015   Required - The access token issued by the authorization server

`token_type [1..1]`

             Required - Fixed value: "Bearer".

`expires_in [0..1]`

             Optional - Lifetime in seconds of the access_token, after which the token SHALL NOT
1020   be accepted by the resource server.

`scope [1..1]`

             Required - Scope of access authorized. Note that this can be different from the scopes
             requested by the Form Manager.

`id_token [0..1]`

1025   Optional - Authenticated patient identity and profile.

`refresh_token [0..1]`

             Optional - Token that can be used to obtain a new access token, using the same or a
             subset of the original authorization grants.

1030   Additional parameters will be returned by the Data Responder depending on integration needs.
       Those additional parameters may be further constrained by future profiles. Common examples
       include:

`patient [0..1]`

1035   Optional - Identifier of a patient for use with Mobile Populate Form.

`researchSubject [0..1]`

Optional - Identifier of a research subject for use with Mobile Populate Form.

`researchStudy [0..1]`

Optional - Identifier of a research study for use with Mobile Populate Form.

1040

3.51.4.2.3 Expected Actions

The Form Manager has received access to the FHIR resource server and will use the parameters received to initiate Mobile Populate Form Request(s).

1045 The FHIR standard provides encodings for responses as either XML or JSON. The Data Responder SHALL accept both media types application/json+fhir and application/xml+FHIR. The Form Manager SHALL support one and may support both. See ITI TF-2x: Appendix Z.6 for details.

There may be cases where a Mobile Retrieve Access Token Request from the Form Manager to the Data Responder requests one set of resources, but the Mobile Retrieve Access Token 1050 Response from the Data Responder to the Form Manager does not allow access to those resources. The Data Responder SHALL respond with the scopes for which it is granting access. The provided scopes may not match those requested by the Form Manager.

3.51.5 Security Considerations

The Mobile Retrieve Access Token Response is a PHI-Export event, as defined in ITI TF-2a: 1055 Table 3.20.4.1.1.1-1.

3.51.5.1 Security Audit Considerations

The Security audit criteria are similar to those for the Retrieve Form for Data Capture [ITI-34] transaction as this transaction does communicate clinical data for purposes of form completion. The Form Manager SHOULD generate an equivalent to the audit message defined in the Clinical 1060 Research Document (CRD) Profile 5.Z3.1.2. The Data Responder SHOULD generate an equivalent to the audit message defined in the Clinical Research Document (CRD) Profile 5.Z3.1.1.

3.52 Mobile Populate Form [QRPH-52]

This section corresponds to Transaction QRPH-52 of the IHE Technical Framework. Transaction 1065 QRPH-52 is used by the Form Manager and Data Responder Actors.

3.52.1 Scope

This transaction is used to request form completion data from a Data Responder.

3.52.2 Actor Roles
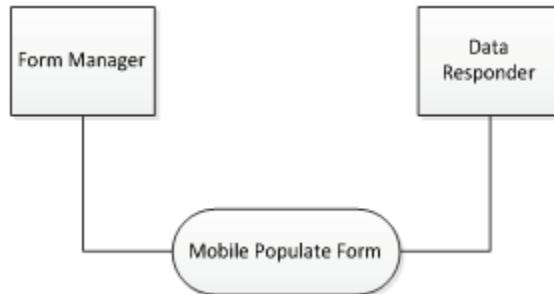
1070

Figure 3.52.2-1: Mobile Populate Form Use Case Diagram

Table 3.52.2-1: Mobile Populate Form Actor Roles

Actor:	Form Manager
Role:	Represents a system that needs access to clinical data to be used to populate a form.
Actor:	Data Responder
Role:	Contains form data.

3.52.3 Referenced Standards

1075

HL7 FHIR	HL7 FHIR standard http://hl7.org/fhir
IETF RFC 2616	Hypertext Transfer Protocol - HTTP/1.1
IETF RFC 7540	Hypertext Transfer Protocol - HTTP/2
IETF RFC 3986	Uniform Resource Identifier (URI): Generic Syntax
IETF RFC 4627	The application/json Media Type for JavaScript Object Notation (JSON)
IETF RFC 6585	Additional HTTP Status Codes
SMART on FHIR	https://hl7.org/fhir/ihe/links/apps

3.52.4 Interaction Diagram
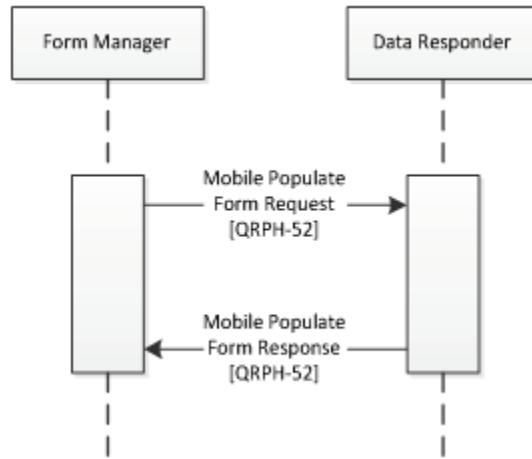
3.52.4.1 Mobile Populate Form Request

1080 This message uses the HTTP POST method on the target endpoint to convey specific desired resources.

3.52.4.1.1 Trigger Events

This method is invoked when a Form Manager needs to retrieve data for populating a form from a Data Responder.

1085 ## 3.52.4.1.2 Message Semantics

The Form Filler executes an HTTP GET against a Data Responder's resource URL. Note that the access_token received in QRPH-51 will be used if this is the preferred Data Responder as part of the GET.

Part of the HTTP Authorization header will include the access token provided earlier.

1090

```
https://[Responder's FHIR Base URL]/[Resource Requested]
```

3.52.4.1.2.1 Mobile Populate Form Request Parameters

The Form Filler MAY send any of the parameters it received during a Mobile Retrieve Access Token Response, or additional query parameters that fit the integration needs.

1095

```
Responder's FHIR Base URL [1..1]
```

> The endpoint to use to retrieve FHIR resources

```
Resources Requested [0..*]
```

Requested resources are open to a given integration.

1100

Common examples include:

```
patient [0..*]
```

Identifier of a patient

```
researchSubject [0..*]
```

1105   Identifier of a research subject

```
researchStudy [0..*]
```

Identifier of a research study

3.52.4.1.3 Expected Actions

The Data Responder will process the query and provide a Mobile Populate Form Response to the
1110   Form Manager.

The FHIR standard provides encodings for responses as either XML or JSON. The Data
Responder SHALL accept both media types application/json+fhir and application/xml+FHIR.
The Form Manager SHALL support one and may support both. See ITI TF-2x: Appendix Z.6 for
details.

3.52.4.2 Mobile Populate Form Response
1115

This message returns a FHIR bundle including the requested resources.

3.52.4.2.1 Trigger Events

This message is generated when a Data Responder receives a Mobile Populate Form Request.

3.52.4.2.2 Message Semantics

1120
```
{
   "resourceType" : "Bundle",
   "type" : "[Bundle Type]",
   "entry" : [{
      "link" : [{ "https://[Responder URL]/Patient/[Unique ID]"
```
1125
```
   }],
      "fullUrl" : ""https://[Responder URL]/Patient/[Unique ID]"",
      "resource" : { [Requested Resources] },
      "search" : {
```

```
        "mode" : "<Mode code>",
1130    }],
    }]
}
```

3.52.4.2.2.1 Mobile Populate Form Response Parameters

The Data Responder SHOULD respond with the requested resources if the Form Manager has access to them. It may not respond with all resources requested if they are not available or if access was not granted to those resources.

```
Bundle Type [1..1]
```
The FHIR BundleType of this message.

```
Responder URL [1..1]
```
The FHIR server's base URL.

```
Unique ID [1..1]
```
The unique ID for that resource.

```
Requested Resources [1..1]
```
Requested resources have a variety of structures that include the various resources being requested and their related information.

```
Mode Code [1..1]
```
The SearchEntryMode for this message.

Common examples of requested resource information include:

```
patient [0..*]
```
Identifier of a patient

```
researchSubject [0..*]
```
Identifier of a research subject

```
researchStudy [0..*]
```
Identifier of a research study

Other parameters that MAY be returned to indicate error states include

```
operationOutcome [0..1]
```

1160   Optional - OperationOutcomes MAY be used to provide additional hints and warnings
about the search process.

3.52.4.2.3 Expected Actions

The Form Manager uses the retrieved data to populate the form URL that has been provided to
the Form Filler.

1165 The FHIR standard provides encodings for responses as either XML or JSON. The Data
Responder SHALL accept both media types application/json+fhir and application/xml+FHIR.
The Form Manager SHALL support one and may support both. See ITI TF-2x: Appendix Z.6 for
details.

There may be situations where a Mobile Populate Form Request requests access to resources that
are not within the scope granted by the Data Responder. In those cases, a FHIR Bundle
1170 containing the OperationOutcome element MAY be returned by the Data Responder to indicate
that the scope was modified and that some requested data will not be returned. Additional
guidance on how to respond with search hints and warnings is available through HL7.

- http://hl7.org/fhir/search.html#errors

3.52.5 Security Considerations

1175 The Mobile Populate Form Response is a PHI-Export event, as defined in ITI TF-2a: Table
3.20.4.1.1.1-1.

3.52.5.1 Security Audit Considerations

The Security audit criteria are similar to those for the Retrieve Form for Data Capture [ITI-34]
transaction as this transaction does communicate clinical data for purposes of form completion.
1180 The Form Manager SHOULD generate an equivalent to the audit message defined in the Clinical
Research Document (CRD) Profile Section 5.Z3.1.2. The Data Responder SHOULD generate an
equivalent to the audit message defined in the Clinical Research Document (CRD) Profile
Section 5.Z3.1.1.

Appendices

1185

Not Applicable

Volume 3 – Content Modules

1190 ## 5 Namespaces and Vocabularies

Not Applicable

6 Content Modules

Not Applicable

1195 # **Appendices**

Not Applicable

1200

Volume 4 – National Extensions

There are no national extensions for the mRFD Profile.